ESTIMASI STOK KARBON BERBAGAI JENIS TANAMAN PADA HUTAN TANAMAN INDUSTRI BKPH BANDUNG, KPH PURWODADI, JAWA TENGAH

HALAMAN JUDUL

TESIS

Disusun sebagai salah satu syarat mencapai derajat
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Estimasi Stok Karbon Berbagai Jenis Tanaman di Hutan Tanaman Industri BKPH Bandung, KPH Purwodadi, Jawa Tengah

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ABSTRAK

Perubahan iklim yang disebabkan oleh peningkatan emisi gas rumah kaca mendorong perlunya strategi mitigasi melalui peningkatan simpanan karbon pada ekosistem daratan. Penelitian ini bertujuan untuk mengestimasi stok karbon pada berbagai jenis tanaman di Hutan Tanaman Industri BKPH Bandung, KPH Purwodadi, Jawa Tengah. Sampel diambil dari 15 titik menggunakan metode purposive sampling berdasarkan variasi kelerengan, jenis tanah, dan vegetasi. Parameter yang diamati meliputi sifat fisik dan kimia tanah, biomassa tanaman, seresah, karbon rekalsitran, dan indeks vegetasi (NDVI). Estimasi dilakukan untuk stok karbon pada biomassa atas dan bawah permukaan, seresah, serta tanah, dengan pendekatan regresi linier sederhana untuk analisis hubungan antar variabel. Hasil penelitian menunjukkan bahwa stok karbon tertinggi terdapat pada tegakan jati umur 9–15 tahun dan tanaman kaliandra merah umur 4 tahun. Tanaman jati menunjukkan akumulasi karbon yang tinggi pada biomassa seiring bertambahnya umur, sedangkan kaliandra merah memiliki laju pertumbuhan dan penyerapan karbon yang cepat dalam waktu singkat. Kandungan karbon rekalsitran lebih tinggi pada tanah di bawah tegakan jati tua, yang menunjukkan potensi simpanan karbon jangka panjang. Sementara itu, hubungan NDVI dengan biomassa dan stok karbon permukaan tergolong lemah pada kawasan penelitian. Kesimpulan dari penelitian ini menegaskan bahwa jenis dan umur tanaman sangat memengaruhi besar kecilnya stok karbon di suatu kawasan. Kombinasi antara jenis tanaman cepat tumbuh dan tanaman berkayu keras dapat menjadi strategi efektif dalam pengelolaan karbon berkelanjutan. Selain itu, fraksi karbon rekalsitran dan karakteristik tanah juga perlu diperhatikan sebagai komponen penting dalam stabilitas stok karbon jangka panjang.

Kata Kunci : stok karbon, biomassa, karbon rekalsitran, hutan tanaman industri, NDVI

Estimation of Carbon Stocks of Various Plant Species in Industrial Plantation Forest, BKPH Bandung, KPH Purwodadi, Central Java

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ABSTRACT

Climate change driven by increased greenhouse gas emissions necessitates mitigation strategies through enhanced carbon sequestration in terrestrial ecosystems. This research aimed to estimate carbon stocks of various plant species in the Industrial Plantation Forest of BKPH Bandung, KPH Purwodadi, Central Java. Sampling was conducted at 15 purposively selected points representing variations in slope, soil type, and vegetation. Parameters observed included soil physical and chemical properties, plant biomass, litter, recalcitrant carbon, and vegetation indices (NDVI). Carbon stock estimation was conducted for aboveground and belowground biomass, litter, and soil compartments, employing simple linear regression analysis to explore relationships among variables. The results revealed that the highest carbon stocks occurred in teak stands aged between 9–15 years and red calliandra at the age of 4 years. Teak exhibited high carbon accumulation in biomass with increasing age, whereas calliandra demonstrated rapid growth and swift carbon uptake within a shorter time frame. Recalcitrant carbon content was notably higher in soils beneath older teak stands, indicating long-term carbon storage potential. However, the correlation between NDVI and biomass or surface carbon stocks was relatively weak across the study area. In conclusion, plant species and age significantly influence the magnitude of carbon stocks in an area. Combining fast-growing species with hardwood plants presents an effective strategy for sustainable carbon management. Additionally, soil characteristics and recalcitrant carbon fractions should be considered critical components for ensuring long-term stability of ecosystem carbon stocks.

Keywords: carbon stock, biomass, recalcitrant carbon, industrial plantation forest, NDVI

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